AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (currently amended): A gas sensor ~~characterized by~~ comprising a proton conductive layer which conducts protons; ~~and~~ first and second electrodes provided in contact with the proton conductive layer, each of the electrodes including electro-chemically active catalyst and being in contact with an atmosphere of an analyte ~~gas, wherein~~ gas; and

~~an~~ AC voltage ~~is applied~~ application means for applying an AC voltage between the first and second electrodes so as to measure an impedance between the first and second electrodes, and so as to obtain a concentration of a catalyst poison gas contained in the analyte gas ~~is obtained~~ on the basis of the impedance measurement.

2. (currently amended): A gas sensor ~~characterized by~~ comprising a proton conductive layer which conducts protons; a first electrode provided in contact with the proton conductive layer, the first electrode including electro-chemically active catalyst and being shielded from an atmosphere of an analyte gas; ~~and~~ a second electrode provided in contact with the proton conductive layer, the second electrode including electro-chemically active catalyst and being in contact with the analyte-gas ~~atmosphere, wherein~~ atmosphere; and

~~an~~ AC voltage ~~is applied~~ application means for applying an AC voltage between the first and second electrodes so as to measure an impedance between the first and second electrodes, and so as to obtain a concentration of a catalyst poison gas contained in the analyte gas ~~is obtained~~ on the basis of the impedance measurement.

3. (currently amended): A gas sensor as described in claim 2, ~~wherein the impedance between the first and second electrodes is measured in a state in which a~~ which comprises DC voltage ~~is applied~~ application means for applying a DC voltage between the first and second electrodes such that the first electrode is higher in electrical potential than the second electrode in a state in which the impedance between the first and second electrodes is being measured.

4. (original): A gas sensor as described in claim 3, wherein the DC voltage is equal to or lower than 1200 mV.

5. (currently amended): A gas sensor ~~characterized by~~ comprising a proton conductive layer which conducts protons; a diffusion-rate determining portion for determining the rate of diffusion of an analyte gas; a measurement chamber communicating with an atmosphere of the analyte gas via the diffusion-rate determining portion; a first electrode accommodated in the measurement chamber, the first electrode being in contact with the proton conductive layer and including electro-chemically active catalyst; ~~and~~ a second electrode provided outside the measurement chamber, the second electrode being in contact with the proton conductive layer and including electro-chemically active ~~catalyst, wherein~~ catalyst;

~~a~~ DC voltage ~~is applied~~ application means for applying a DC voltage between the first and second electrodes such that the first electrode is higher in electrical potential than the second electrode, to thereby pump hydrogen or ~~protons, an~~ protons; and AC voltage ~~is applied~~ application means for applying an AC voltage between the first and second electrodes so as to measure an impedance between the first and second electrodes, and so as to obtain a concentration of a catalyst poison gas contained in the analyte gas is obtained on the basis of the impedance.

6. (currently amended): A gas sensor ~~characterized by~~ comprising a proton conductive layer which conducts protons; a diffusion-rate determining portion for determining the rate of diffusion of an analyte gas; a measurement chamber communicating with an atmosphere of the analyte gas via the diffusion-rate determining portion; a first electrode accommodated in the measurement chamber, the first electrode being in contact with the proton conductive layer and including electro-chemically active catalyst; ~~and~~ a second electrode and a reference electrode provided outside the measurement chamber, the second and reference electrodes being in contact with the proton conductive layer and including electro-chemically active ~~catalyst, wherein~~ catalyst;

~~the gas sensor has a first operation step in which a~~ DC voltage ~~is applied~~ application means for applying a DC voltage in a first operation step between the first and second electrodes such that the first electrode is higher in electrical potential than the second electrode and such that a predetermined potential difference is produced between the first electrode and the reference electrode, and ~~a second operation step in which~~ for applying a DC voltage ~~is applied~~ in a second operation step between the first and second electrodes so as to pump hydrogen or ~~protons, and an~~ protons; and AC voltage ~~is applied~~ application means for applying an AC voltage between the first and second electrodes so as to measure an impedance between the first and second electrodes, ~~wherein~~ and to obtain a concentration of a catalyst poison gas contained in the analyte gas ~~is obtained~~ on the basis of the impedance obtained in the second operation step.

7. (original): A gas sensor as described in claim 6, wherein the second electrode serves as the reference electrode, and the second electrode and the reference electrode are integrated into a single member.

8. (currently amended): A gas sensor as described in claim 6, wherein ~~the~~ said DC voltage application means comprises means for applying a potential difference between the first electrode and the reference electrode that is equal to or greater than a potential for oxidation of the catalyst poison gas.

9. (original): A gas sensor as described in claim 8, wherein the potential difference between the first electrode and the reference electrode is equal to or higher than 250 mV.

10. (previously presented): A gas sensor as described in claim 5, wherein the AC voltage is applied between the first and second electrodes so as to measure the impedance in a state in which a DC voltage is applied between the first and second electrodes.

11. (original): A gas sensor as described in claim 10, wherein the DC voltage applied between the first electrode and the second electrode is equal to or higher than a voltage for oxidation of the catalyst poison gas.

12. (original): A gas sensor as described in claim 11, wherein the DC voltage applied between the first electrode and the second electrode is equal to or higher than 400 mV.

13. (previously presented): A gas sensor as described in claim 11, wherein the lower limit value of the AC voltage which is applied between the first electrode and the second electrode in a state in which the DC voltage is applied between the first electrode and the second electrode is equal to or higher than a voltage for oxidation of the catalyst poison gas.

14. (original): A gas sensor as described in claim 13, wherein the lower limit value of the AC voltage is 400 mV or higher.

15. (previously presented): A gas sensor as described in claim 5, wherein a current which flows upon application of voltage between the first and second electrodes is a limiting current.

16. (original): A gas sensor as described in claim 15, wherein a hydrogen concentration of the analyte gas is obtained from the limiting current.

17. (previously presented): A gas sensor as described in claim 5, wherein the catalyst contained in the first electrode is a catalyst capable of adsorbing the catalyst poison gas contained in the analyte gas and generating hydrogen or protons through decomposition, dissociation, or reaction with a hydrogen-containing substance.

18. (previously presented): A gas sensor as described in claim 1, wherein the concentration of the catalyst poison gas contained in the analyte gas is obtained on the basis of the impedance measured through application of AC voltages of different frequencies between the first and second electrodes.

19. (original): A gas sensor as described in claim 18, wherein the impedance measured through application of AC voltages of different frequencies includes two impedances which are measured through application of an AC voltage having a switching waveform composed of alternating waveforms of two different frequencies.

20. (original): A gas sensor as described in claim 18, wherein the impedance measured through application of an AC voltages of different frequencies includes two impedances which are measured through application of AC voltage having a composite waveform composed of waveforms of two different frequencies.

21. (previously presented): A gas sensor as described in claim 19, wherein one of the two different frequencies falls within a range of 10000 Hz to 100 Hz, and the other frequency falls within a range of 10 Hz to 0.05 Hz.

22. (previously presented): A gas sensor as described in claim 1, wherein the AC voltage applied between the first and second electrodes is 5 mV or higher.

23. (previously presented): A gas sensor as described in claim 1, wherein the catalyst used for the second electrode is a catalyst capable of adsorbing the catalyst poison gas contained in the analyte gas.

24. (previously presented): A gas sensor as described in claim 1, wherein the density of the catalyst used for the electrodes falls within a range of 0.1 $\mu g/cm^2$ to 10 mg/cm^2.

25. (previously presented): A gas sensor as described in claim 1, wherein the catalyst poison gas is CO or a sulfur-containing substance.